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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/459,598	12/14/1999	SHARON LEVY	162/01172	1376

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EXAMINER

CHAUDRY, M. MUJTABA K

ART UNIT	PAPER NUMBER
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2133

DATE MAILED: 10/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/459,598

Applicant(s)

LEVY, SHARON

Examiner

Mujtaba K Chaudry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 December 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (as stated in the specification, pg. 8, 22-24). See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to because:
 - In Figure 2:
 - o Item 24 should be labeled as “buffer memory” as stated in the specification.
 - o Item 25 should be labeled as “Branch Metric Unit” as stated in the specification.
 - o Reference numbers 34 and 36 need to be rearranged such that it is clear to what each refers to specifically.
 - o The controller 32 is described to control the timing of the decoder 20. Therefore, perhaps there should be some linkage between the two.
 - o Item 30 should be labeled as “log likelihood ratio unit” as stated in the specification.
 - o Items 36 & 38 should be labeled as “short term” and “long-term” respectively.
 - Figures 3A and 3B should perhaps be combined into one figure (namely Figure 3) and indicate (on the second page) continuation of the flowchart as intended.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
4. The disclosure is objected to because of the following informalities:
 - In the abstract, on line 1 between the two words "...symbols, the..." the term "wherein" should be inserted.
 - The term "pre-calculating" should perhaps be replaced with just "calculating" since the next part second calculating. Otherwise it implies a "calculating" step, which is not disclosed. (i.e. pre-cal. → cal. → 2nd cal.)
 - Throughout the specification the applicant uses "further alternatively or additionally" and this should be limited to only one transitional phrase. "Further alternatively or" should be omitted. Other similar mistakes should also be reviewed and corrected accordingly.
 - On page 5, line 6 the sentence starts with "There is therefore..." which should be reworded as "Therefore there is..."
 - The term "preferably" is used excessively throughout the specification and should be reconsidered.

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- All reference numbers throughout the specification should be in parenthesis.
- The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-34, 37-38, 40, and 42-49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims include terminology that is vague. The following terms/phrases (and others of the like) are to be corrected in the claims to distinctly claim the invention: "at least some of the at least some," "substantially" and "fewer than." For instance, it is not clear in claim 1 (and subsequent claims) what is exactly meant by "first side of the block symbols." The applicant is strongly recommended to revisit each problematic claim and rewrite it clearly and concisely.
6. Claim 1 recites the limitation "the state metric vectors" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. Perhaps it should read as ""the recursive

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state metric vectors." It is important to note this change may be needed in subsequent claims.

7. Claim 1 recites the limitation "the block" in line 2. There is insufficient antecedent basis for this limitation in the claim. Perhaps it should read as "the block of symbols." It is important to note this change may be needed in subsequent claims.
8. Claim 3 recites the limitation "pre-calculated vectors" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. Perhaps it should read as "pre-calculated state metric vectors." It is important to note this change may be needed in subsequent claims.
9. Claim 4 recites the limitation "vectors" in line 2. There is insufficient antecedent basis for this limitation in the claim. Perhaps it should read as "pre-calculated state metric vectors." It is important to note this change may be needed in subsequent claims.
10. Claim 6 recites the limitation "the locations of singular functions" in line 2. There is insufficient antecedent basis for this limitation in the claim.
11. Claim 12 recites the limitation "the at least some of the vectors" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim. It is important to note this problem may exist in subsequent claims.
12. Claim 15 recites the limitation "the function" in line 2. There is insufficient antecedent basis for this limitation in the claim. It is important to note this problem may exist in subsequent claims.

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13. Applicant is requested to revisit each claim to address all “antecedent basis” issues. The previous example should be used as a guide. Furthermore, applicant is strongly recommended to make claim language clear and concise.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
14. Claims 1-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lerzer (USPN 6343368 B1) further in view of Viterbi et. al. (USPN 5933462).

As per claims 1-49, Lerzer substantially teaches a method and system for fast maximum A’Posteriori decoding (also known as Bahl decoding col. 2, lines 41-47). Lerzer teaches (col. 11, lines 25-42) a method for decoding a sequence of N received symbols utilizing the MAP algorithm, which (described in col. 11) calculates the first and second branch transition metrics from a block of symbols followed by further

calculations of the recursive forward and reverse state metrics as stated in the present application. It can be seen from Figure 2 that the state metrics are calculated before supplying them to the LRC unit (analogous to calculating unit in the present application). Lerzer teaches a storing unit (Figure 2) for storing forward state metrics (FSM) and reverse state metrics (RSM) in accordance with one of the MAP algorithms, as described in the present application. These elements are used to buffer and control the presentation of metric values to the LRC units, by timing and control unit. Furthermore, there (Figure 2) are two calculating units for computing the forward state metric calculations (FSMC— analogous to ‘function’ in the present application) and reverse state metric calculations (RSMC— analogous to ‘reverse function’ in the present application). The examiner would like point out that the storage and calculation of the state metrics are based on a signal that the branch transition metric calculation (BTMU) unit receives. This signal is in accordance to one of the following algorithms: the MAP algorithm, the log-MAP algorithm or the Max-log-MAP algorithm, which are explained in detail in the specification. Lerzer teaches the steps in detail (col. 12) wherein the first and second branch transition metrics are calculated based on received symbols and the reverse state metric is stored, as stated in the present application. Lerzer determines a plurality of state metrics based on the branch transition metric, which are based on preceding values. Lerzer teaches to calculate the plurality of state metrics in parallel (analogous to concurrently) as seen in Figure 2 and col. 12. Lerzer teaches a calculation unit (col. 11) that calculates, after a predetermined number of forward state metrics and reverse state metrics, the likelihood ratios based upon a combination of branch transition metrics.

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Moreover, Lerzer teaches (col. 12) the branch transitional metric, forward state metrics, reverse state metrics and likelihood ratios are calculated in accordance with the log-MAP algorithm (analogous to first function in the present application). Lerzer teaches forward state metric memory and a reverse state metric memory (analogous to maximal storage space) for storing the predetermined number of state metrics. Lerzer teaches the implementation of various functions including the MAP algorithm, log-MAP algorithm and the MAX-log-MAP algorithm. Lerzer does not explicitly teach the use of a memory unit prior to the branch metric unit for storing state metric vectors as stated in the present application. However, Viterbi et. al. (herein after: Viterbi) in an analogous art teaches (Abstract) soft decision output decoding techniques for a sequence of signals received over a channel during forward iteration through a trellis representing the encoder output with a block length T. Viterbi teaches (Figure 4 and col. 8) a memory that receives the demodulated signal and delays the inputs as stated in the present application. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate this memory unit in the design taught by Lerzer prior to the branch transition metric calculation unit to form the present invention. This modification would have been obvious to one of ordinary skill in the art because one of ordinary skill would have realized that by including Viterbi's memory unit prior to Lerzer's branch transition metric calculation unit would provide performance benefits associated with the decoder while avoiding excessive memory requirements.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lerzer teaches a method for decoding a sequence of N received symbols utilizing the MAP algorithm, which calculates the first and second branch transition metrics from a block of symbols followed by further calculations of the recursive forward and reverse state metrics. Viterbi et. al. teaches soft decision output decoding techniques for a sequence of signals received over a channel during forward iteration through a trellis representing the encoder output with a block length T. Applicant is further invited to review additional references included within this action.

Any inquiry concerning this communication should be directed to the examiner, Mujtaba Chaudry whose telephone is 703-305-7755. The examiner can normally be reached Mon – Thur 7:30am to 4:30pm and every other Fri 8:00am – 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, please contact the examiner's supervisor, Albert DeCady at 703-305-9595. The fax phone number for the organization where this application is assigned is 703-746-7239.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist at 703-305-3900.

Mujtaba Chaudry

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October 7, 2002

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